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09/823,852	03/29/2001	Naoyasu Miyagawa	CALMP029	7011

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LSI LOGIC CORPORATION
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PATENT LAW DEPARTMENT
MILPITAS, CA 95035

EXAMINER

PATEL, GAUTAM

ART UNIT	PAPER NUMBER
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2655

DATE MAILED: 06/10/2004

13

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/823,852

Applicant(s)

MIYAGAWA ET AL.

Examiner

Gautam R. Patel

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-13 and 16-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-13 and 16-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Response to Amendment

1. This is in response to amendment filed on 4-26-04 (Paper # 11 & 12).
2. Claims 3-13 and 16-33 remain for examination. Claims 30-33 are newly presented for examination.
3. Applicant's arguments regarding objection to drawings and specification have been considered and objection has been **withdrawn**.

NOTES/REMARKS

4. Block 212 of newly added Fig. 10B, has "analog waveforms being compared to pre-stored waveforms". This concept is not very clearly defined in the specification and nearly borders as new matter. The Applicants are strongly urged not to put any matter that could be construed as a new matter.

Claim Rejections - 35 U.S.C. § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 3-7, 11-13, 16 and 25-28 are rejected under 35 U.S.C. § 102(b) as being anticipated by Fuji, US. patent 5,537,381 (hereafter Fuji).

As to claim 3, Fuji discloses the invention as claimed [see Figs. 1-31, especially 11-15] including mapping the data to a set of write symbols, defining a set of variable write parameters, generating a plurality of candidate write symbols, generating a plurality of readout waveforms, analyzing the readout waveforms, selecting selected ones of the plurality of candidate write symbols and writing the data to the medium, comprising the steps of:

mapping the data to a set of write symbols [fig. 14, set of "0" and "1"] wherein each write symbol represents more than one bit [three zeros than one etc.] of the data and wherein the set of write symbols is defined by [col. 14, line 41 to col. 15, line 29 and fig. 13]:

defining a set of variable write parameters [col. 14, line 50 to col. 15, line 29 and fig. 13];

generating a plurality of candidate write symbols [fig. 12] that specify different values for the variable write parameters [col. 13, line 50 to col. 14, line 15];

generating a plurality of readout waveforms [fig. 14 & 15] produced by the plurality of candidate write symbols [col. 14, line 41 to col. 15, line 29];

analyzing the readout waveforms to determine a set of distinguishable readout waveforms [col. 14, line 41 to col. 15, line 29]; and

selecting selected ones of the plurality of candidate write symbols that correspond to the distinguishable readout waveforms to be included in the set of write symbols [col. 14, line 41 to col. 15, line 29]; and

writing the data to the medium using the set of write symbols [col. 14, line 41 to col. 15, line 29].

6. As to claim 4, Fuji discloses:

the medium is an optical disc [col. 23, lines 11-20].

7. As to claim 5, Fuji discloses:

the medium is a phase change optical disc [col. 23, lines 11-20].

8. As to claim 6, Fuji discloses:

the set of variable write parameters defines characteristics of a sequence of laser pulses [col. 14, lines 1-12 and fig. 11].

9. As to claim 7, Fuji discloses:

the set of variable write parameters defines the timing of a sequence of laser pulses [col. 13, lines 49-56].

10. As to claim 11, Fuji discloses:

a matched filter is used to recover the data [fig. 10, unit 49] [col. 13, lines 50-67].

NOTE: see also fig. 1.

11. As to claim 12, Fuji discloses:

a cross correlation coefficient is calculated to recover the data [col. 13, lines 50-67].

NOTE: see also fig. 1.

12. As to claim 13, Fuji discloses:

a combination of a cross correlation coefficient and comparison of a DC level is used to recover the data [col. 19, lines 1-9].

13. As to claim 16, it is rejected for the same reasons set forth in the rejection of claim 3, supra.

14. As to claims 25-28, they are claims corresponding to claims 4-7 respectively and they are therefore rejected for the same reasons set forth in the rejection of claims 4-7 respectively, supra.

Claim Rejections - 35 U.S.C. § 103

15. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuji as applied to claim 3-7 above and in view of Pettigrew et al., US. patent 4,703,469 (hereafter Pettigrew).

Fuji discloses all of the above elements, including write symbols generation and avoiding the thermal crosstalk and inter-symbol interference by detecting "delta v" [see col. 9, lines 14-67]. Fuji does not specifically disclose that the same goal of reducing thermal crosstalk and inter-symbol interference can also be achieved by well-known method of inserting guard bands.

However, it is well known in the art that all recording inherently have to have guard bands to avoid crosstalk between tracks or between any data such as write symbols. Without guard bands data cannot be read properly and system will not function at all. And by using guard bands of appropriate size crosstalk between adjacent data [write symbols] can be reduced or avoided. Also Pettigrew clearly discloses that it is well known in the art:

writing the data to the medium includes inserting guard bands between the write symbols [ABSTRACT, and col. 1, lines 11-34 and col. 4, line 61 to col. 5, line 19 and fig. 1].

Both Fuji and Pettigrew are interested in improving the read/write mechanism of an optical disk. Both Fuji and Pettigrew show system to reduce crosstalk and thermal interference, both create write symbols for optical disks.

One of ordinary skill in the art at the time of invention would have realized that the crosstalk and inter-symbol interference is present on all the disks at all data levels that are recorded and reduction of these kind of noises is a good and necessary characteristic to have. Therefore, it would have been obvious to have used guard band mechanism in the system of Fuji as taught by Pettigrew because one would be

motivated to reduce noise and cross-talk or intersymbol interference in the system of Fuji and provide better signal controls with help of well known guard bands and improve quality of the write symbol signals [col. 1, lines 11-29; Pettigrew].

NOTE: Pettigrew discloses guard bands between tracks, but since different write symbols can be and are generally recorded on different tracks also. The same guard bands or concept of the guard bands are also equally applicable to guard bands between write symbols.

16. As to claim 9, Pettigrew discloses:

writing the data to the medium includes inserting guard bands between the write symbols wherein the guard bands are appropriately sized to avoid intersymbol interference [ABSTRACT, and col. 1, lines 11-34 and col. 4, line 61 to col. 5, line 19 and fig. 1].

17. As to claim 10, Pettigrew discloses:

writing the data to the medium includes inserting guard bands between the write symbols wherein the guard bands are appropriately sized to avoid thermal crosstalk [ABSTRACT, and col. 1, lines 11-34 and col. 2,, lines 13-63].

18. Claims 17-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuji as applied to claims 3-7 and 16 above, and further in view of McNeil et al., US. patent 5,995,305 (hereafter McNeil).

Fuji discloses all of the above elements, including write symbols that specify different values for the variable write parameters. Fuji does not specifically discloses what kind of algorithm is being used for generation of the write symbols.

However, it is well known in the art that all recording patterns inherently have to be generated by some kind of algorithm, specific and/or generic. Also McNeil clearly discloses:

generating a plurality of candidate write symbols that specify different values for the variable write parameters includes using a genetic algorithm to generate the plurality of candidate write symbols [col. 6, lines 26-53].

Both Fuji and McNeil are interested in improving the read/write mechanism of an optical disk. Both Fuji and McNeil discloses write pattern generation by controlling laser current and power.

One of ordinary skill in the art at the time of invention would have realized that all kind noise and disturbance needs to be control in all kind environment including off-track noise. Ability to control off-track noise is a good characteristic to have in a system and appropriate algorithm needs to be applied for this ability. Therefore, it would have been obvious to have used an optimization algorithm [generic algorithm] in the system of Fuji as taught by McNeil because one would be motivated to reduce noise and cross-talk or intersymbol interference under all conditions in the system of Fuji and provide better signal controls with help of well known bands and improve quality of the signals [col. 5, lines 38-52; McNeil].

19. As to claim 18, McNeil discloses:

generating a plurality of candidate write symbols that specify different values for the variable write parameters includes randomly generating the plurality of candidate write symbols [col. 7, lines 48-67].

20. As to claim 19, McNeil discloses:

generating a plurality of candidate write symbols that specify different values for the variable write parameters includes using expert knowledge to generate the plurality of candidate write symbols [col. 9, lines 15-67].

21. As to claim 20, McNeil discloses:

a plurality of candidate write symbols that specify different values for the variable write parameters includes using expert knowledge to generate an initial set of candidate

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write symbols and using a genetic algorithm to refine the initial set of candidate write symbols [col. 9, lines 15-67]. [col. 9, lines 15-67].

22. As to claim 24, McNeil discloses:

analyzing the readout waveforms produced by the marks to determine a set of readout waveforms that match a read/write channel that includes the recording medium includes determining ideal readout waveforms follow the read/write channel SNR spectrum [col. 5, lines 13-37 and TABLE 1].

23. Claims 21-23 and 29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuji in view of McNeil as applied to claims 16-20, and 24 above, and further in view of Kobayashi et al., US. patent 5,978,333 (hereafter Kobayashi).

Fuji discloses all of the above elements, including write symbols that specify different values for the variable write parameters. Fuji does not specifically disclose that this procedure includes selecting a pair of waveforms to represent individual channel bits and also manipulating these bits to produce desired results.

However, complimentary waveforms [mirror image of each other] are well known in the art for recording patterns on an optical disk. Also Kobayashi clearly discloses:

generating a plurality of candidate write symbols that specify different values for the variable write parameters includes selecting a pair waveforms to represent individual channel bits [col. 3, line 60 to col. 4, line 12].

Both Fuji and Kobayashi are interested in improving the read/write mechanism of an optical disk. Both Fuji and Kobayashi discloses write pattern generation by controlling laser current and power under different condition including wobble pattern.

One of ordinary skill in the art at the time of invention would have realized that intensity of the reflection is not constant in mark position and guard-band or gap, and therefore it is difficult to achieve exact reproduction. Ability to achieve exact reproduction is a desired characteristic to have in a system. Therefore, it would have

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been obvious to have used an a pair waveforms to represent individual channel bits in the system of Fuji as taught by Kobayashi because one would be motivated to achieve exact reproduction in the system of Fuji and provide better signal controls [col. 1, lines 36-44; Kobayashi].

24. As to claim 22, Kobayashi discloses:

generating a plurality of candidate write symbols that specify different values for the variable write parameters includes selecting a pair waveforms to represent individual channel bits and shifting and adding combinations of the waveforms [col. 12, line 5 to col. 13, line 20].

25. As to claim 23, Kobayashi discloses:

generating a plurality of candidate write symbols that specify different values for the variable write parameters includes selecting a pair waveforms to represent individual channel bits [col. 3, line 60 to col. 4, line 12]. As to the rest of the claim McNeil discloses:

wherein the spectrum of the pair of waveforms becomes band-limited and closely resembling the channel's spectrum of signal-to-noise ratio, SNR(f) [col. 5, lines 13-37 and TABLE 1].

26. As to claim 29, Fuji teaches all of the above limitations including recovering data. Fuji does not teach well known use of viterbi detector. "Official Notice" is taken that both the concept and the advantages of providing a viterbi detector are well known and expected in the art. It would have been obvious to include a viterbi detector in the system of Fuji as this viterbi detector are known to provide better decoding for these kind of signals and thereby saving time and money on the decoding these signals These concepts are well known in the art and do not constitute a patentably distinct limitation, per se [M.P.E.P. 2144.03].

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27. Claims 30-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuji as applied to claims 3-7 and 16 above, and further in view of loki et al., US. patent 6,078,451 (hereafter loki).

As to claim 30 Fuji discloses all f the above elements. Fuji does not specifically disclose well known readout waveform comparison with stored data waveforms.

However, loki clearly discloses:

Comparing readout waveforms obtained from individual segments to waveforms in pre-stored tables using predetermined pattern recognition techniques [col. 3, line 66 to col. 4, line 37].

Both Fuji and loki are interested in improving the read/write mechanism of an optical disk. Both Fuji and Kobayashi discloses write pattern generation by controlling laser current and power under different condition.

One of ordinary skill in the art at the time of invention would have realized that low data error rate is a good characteristic to have in the system.

Therefore, it would have been obvious to have used a waveform comparison technique n the system of Fuji as taught by loki because one would be motivated to achieve precise separation of data to achieve low data error rate [col. 2, lines 1-5; loki].

28. As to claim 31 loki, discloses:

Sampling a readout waveform signal;

Normalizing an amplitude of the signal;

Separating the signal into segments [col. 3, line 66 to col. 4, line 37].

29. As to claim 32 loki, discloses:

Calculating a cross-correlation coefficient between the segments and patterns in look-up table [[col. 3, line 66 to col. 4, line 37];

As to rest of the claim Fuji discloses:

Comparing DC level of the segments with patterns in the look-up table [col. 19, lines 1-9]; and figs. 14 and 21].

30. As to claim 33 loki, discloses:

The variable write parameters comprise one or more of a height of a laser pulse, a duration of a laser pulse, a width of a cooling pulse following a heating pulse, an interval between adjacent laser pulses, and a power level of a laser pulse [col. 13, line 56 to col. 14, line 21 and fig. 12].

31. Applicant's arguments filed on 4-26-04 (Paper # 11) have been fully considered but they are not deemed to be persuasive for the following reasons.

32. In the REMARKS, the Applicant argues as follows:

A) That: "Specifically, Fuji does not appear to disclose or suggest mapping data to a set of write symbols where each write symbol represents more than one bit of the data, as presently claimed. Since the patterns disclosed by Fuji are used for test writing recording and the test writing area is separate from the information recording area, it follows that Fuji does not disclose or suggest mapping data to a set of write symbols ...". [page 15, para. 2; REMARKS].

FIRST: Fuji clearly discloses that each write symbol represents more than one bit of the data [see fig. 14]. First pattern has more than one bit similarly second and third pattern also has more than one bit.

SECOND: What else Fuji does [test writing] etc. is immaterial since claim use words "comprising".

THIRD: It is not clear to the examiner as to what does "test writing area being separate from the information recording area" has anything to do with Fuji not disclosing or suggesting mapping data to a set of write symbols? Fuji clearly doing both of these things.

B) That: "Fuji does not appear to disclose or suggest selecting selected one of a plurality of candidate write symbols that corresponds to **distinguishable read out**

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waveforms [original emphasis] to be included in the set of write symbols to which the data is mapped, as presently claimed. [page15-16, Para. 2 and 1; REMARKS].

Fig. 12 clearly shows seven different waveforms, each with different characteristics, obviously made from different write symbols [i.e. different "1" and "0" combination as shown in fig. 14].

C) That: "Fuji appears silent regarding using matched filtered detection to recover the data, as presently claimed. ...Fuji appears silent regarding any of the blocks of fig. 1 using matched filter detection, as presently claimed." [page 16, para. 2; REMARKS].

FIRST: Fig.1, shows comparison technique between two patterns [so called matched filter detection] which produces matched filter detection that recovers data in unit 4.

D) That; "the Office action does not present any evidence or convincing line of reasoning why a person of ordinary skill in the field of invention would consider the operation of element 49 in fig. 10 of Fuji as being identical to matched filter detection," [page 17, para. 2; REMARKS].

The reason one would consider is that Fuji himself clearly states that fig. 10 is related to fig. 1 [see col. 13, lines 50-55]. In other words unit 49 is composed of detection means [col. 13, lines, 57-67].

E) That: "With respect to claim 10, Fuji appears silent regarding using a cross correlation coefficient calculation to recover the data, as presently claimed". [page 18, para. 2; REMARKS].

This is because claim 10 does NOT disclose at all anything about a cross correlation coefficient calculation.

F) That: "Similarly, claim 13 recites a combination of cross correlation coefficient and using a comparison of DC level to recover data." [page 18, para. 2; REMARKS].

Fig. 14 AND fig. 21 clearly shows that DC level is being used to compare the patterns and hence recover the data.

NOTE: No argument has been presented regarding claims 8-10, 17-29, etc. has been presented so as to why they should be patentable and what they do show that is not covered by the rejection, therefore no remarks are addressed to these claims.

33. **THIS ACTION IS MADE FINAL.** See M.P.E.P. § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact information

34. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gautam R. Patel whose telephone number is (703) 308-7940. The examiner can normally be reached on Monday through Thursday from 7:30 to 6.

The appropriate fax number for the organization (Group 2650) where this application or proceeding is assigned is (703) 872-9314.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Doris To can be reached on (703) 305-4827.

Any inquiry of a general nature or relating to the status of this application should be directed to the group receptionist whose telephone number is (703) 305-4700 or the group Customer Service section whose telephone number is (703) 306-0377.



Gautam R. Patel
Primary Examiner
Group Art Unit 2655

GAUTAM R. PATEL
PRIMARY EXAMINER

June 8, 2004